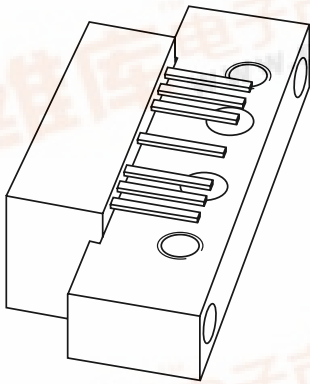


**DISCRETE SEMICONDUCTORS**

# DATA SHEET



## **BGD704** CATV amplifier module

Product specification  
Supersedes data of 1997 Apr 02

1999 Mar 22

## CATV amplifier module

## BGD704

## FEATURES

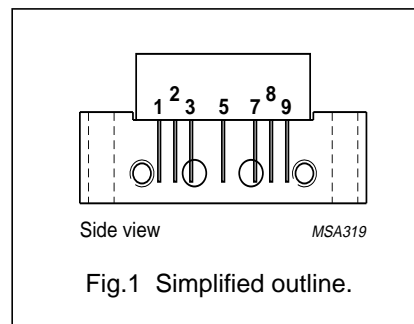
- Excellent linearity
- Extremely low noise
- Silicon nitride passivation
- Rugged construction
- Gold metallization ensures excellent reliability.

## APPLICATIONS

- CATV systems in the frequency range of 40 to 750 MHz.

## PINNING - SOT115J

PIN	DESCRIPTION
1	input
2	common
3	common
5	+V <sub>B</sub>
7	common
8	common
9	output



## DESCRIPTION

Hybrid amplifier module operating at a voltage supply of 24 V (DC) encapsulated in a SOT115J package.

## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
G <sub>p</sub>	power gain	f = 50 MHz	19.5	20.5	dB
		f = 750 MHz	20	–	dB
I <sub>tot</sub>	total current consumption (DC)	V <sub>B</sub> = 24 V	–	435	mA

## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V <sub>i</sub>	RF input voltage	–	65	dBmV
T <sub>stg</sub>	storage temperature	–40	+100	°C
T <sub>mb</sub>	operating mounting base temperature	–20	+100	°C

## CATV amplifier module

## BGD704

## CHARACTERISTICS

**Table 1** Bandwidth 40 to 750 MHz;  $V_B = 24$  V;  $T_{mb} = 35$  °C;  $Z_S = Z_L = 75$   $\Omega$ 

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G <sub>p</sub>	power gain	f = 50 MHz	19.5	20	20.5	dB
		f = 750 MHz	20	21	–	dB
SL	slope cable equivalent	f = 40 to 750 MHz	0	1	2	dB
FL	flatness of frequency response	f = 40 to 750 MHz	–	±0.2	±0.5	dB
S <sub>11</sub>	input return losses	f = 40 to 80 MHz	20	31	–	dB
		f = 80 to 160 MHz	19	29	–	dB
		f = 160 to 320 MHz	18	25	–	dB
		f = 320 to 640 MHz	17	21	–	dB
		f = 640 to 750 MHz	16	21	–	dB
S <sub>22</sub>	output return losses	f = 40 to 80 MHz	20	26	–	dB
		f = 80 to 160 MHz	19	27	–	dB
		f = 160 to 320 MHz	18	26	–	dB
		f = 320 to 640 MHz	17	24	–	dB
		f = 640 to 750 MHz	16	23	–	dB
S <sub>21</sub>	phase response	f = 50 MHz	–45	–	+45	deg
CTB	composite triple beat	110 channels flat; V <sub>o</sub> = 44 dBmV; measured at 745.25 MHz	–	–58	–57	dB
X <sub>mod</sub>	cross modulation	110 channels flat; V <sub>o</sub> = 44 dBmV; measured at 55.25 MHz	–	–63	–61	dB
CSO	composite second order distortion	110 channels flat; V <sub>o</sub> = 44 dBmV; measured at 746.5 MHz	–	–61	–56	dB
d <sub>2</sub>	second order distortion	note 1	–	–75	–66	dB
V <sub>o</sub>	output voltage	d <sub>im</sub> = –60 dB; note 2	60.5	63.5	–	dBmV
F	noise figure	f = 50 MHz	–	4.5	5	dB
		f = 450 MHz	–	–	6.5	dB
		f = 550 MHz	–	–	7	dB
		f = 600 MHz	–	–	7	dB
		f = 750 MHz	–	6.5	8.5	dB
I <sub>tot</sub>	total current consumption (DC)	note 3	–	425	435	mA

## Notes

- f<sub>p</sub> = 55.25 MHz; V<sub>p</sub> = 44 dBmV;  
f<sub>q</sub> = 691.25 MHz; V<sub>q</sub> = 44 dBmV;  
measured at f<sub>p</sub> + f<sub>q</sub> = 746.5 MHz.
- Measured according to DIN45004B:  
f<sub>p</sub> = 740.25 MHz; V<sub>p</sub> = V<sub>o</sub>;  
f<sub>q</sub> = 747.25 MHz; V<sub>q</sub> = V<sub>o</sub> –6 dB;  
f<sub>r</sub> = 749.25 MHz; V<sub>r</sub> = V<sub>o</sub> –6 dB;  
measured at f<sub>p</sub> + f<sub>q</sub> – f<sub>r</sub> = 738.25 MHz.
- The module normally operates at V<sub>B</sub> = 24 V, but is able to withstand supply transients up to 30 V.

## CATV amplifier module

## BGD704

**Table 2** Bandwidth 40 to 600 MHz;  $V_B = 24$  V;  $T_{mb} = 35$  °C;  $Z_S = Z_L = 75$   $\Omega$ 

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G <sub>p</sub>	power gain	f = 50 MHz	19.5	20	20.5	dB
		f = 600 MHz	20	20.7	–	dB
SL	slope cable equivalent	f = 40 to 600 MHz	0	–	2	dB
FL	flatness of frequency response	f = 40 to 600 MHz	–	–	±0.3	dB
S <sub>11</sub>	input return losses	f = 40 to 80 MHz	20	31	–	dB
		f = 80 to 160 MHz	19	29	–	dB
		f = 160 to 320 MHz	18	25	–	dB
		f = 320 to 600 MHz	17	21	–	dB
S <sub>22</sub>	output return losses	f = 40 to 80 MHz	20	26	–	dB
		f = 80 to 160 MHz	19	27	–	dB
		f = 160 to 320 MHz	18	26	–	dB
		f = 320 to 600 MHz	17	24	–	dB
S <sub>21</sub>	phase response	f = 50 MHz	–45	–	+45	deg
CTB	composite triple beat	85 channels flat; V <sub>o</sub> = 44 dBmV; measured at 595.25 MHz	–	–65	–64	dB
X <sub>mod</sub>	cross modulation	85 channels flat; V <sub>o</sub> = 44 dBmV; measured at 55.25 MHz	–	–65	–64	dB
CSO	composite second order distortion	85 channels flat; V <sub>o</sub> = 44 dBmV; measured at 596.5 MHz	–	–66	–58	dB
d <sub>2</sub>	second order distortion	note 1	–	–	–68	dB
V <sub>o</sub>	output voltage	d <sub>im</sub> = –60 dB; note 2	63	–	–	dBmV
F	noise figure	see Table 1	–	–	–	dB
I <sub>tot</sub>	total current consumption (DC)	note 3	–	425	435	mA

**Notes**

1.  $f_p = 55.25$  MHz;  $V_p = 44$  dBmV;  
 $f_q = 541.25$  MHz;  $V_q = 44$  dBmV;  
measured at  $f_p + f_q = 596.5$  MHz.
2. Measured according to DIN45004B:  
 $f_p = 590.25$  MHz;  $V_p = V_o$ ;  
 $f_q = 597.25$  MHz;  $V_q = V_o - 6$  dB;  
 $f_r = 599.25$  MHz;  $V_r = V_o - 6$  dB;  
measured at  $f_p + f_q - f_r = 588.25$  MHz.
3. The module normally operates at  $V_B = 24$  V, but is able to withstand supply transients up to 30 V.

## CATV amplifier module

## BGD704

**Table 3** Bandwidth 40 to 550 MHz;  $V_B = 24$  V;  $T_{mb} = 35$  °C;  $Z_S = Z_L = 75$   $\Omega$ 

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G <sub>p</sub>	power gain	f = 50 MHz	19.5	20	20.5	dB
		f = 550 MHz	20	20.6	–	dB
SL	slope cable equivalent	f = 40 to 550 MHz	0	–	2	dB
FL	flatness of frequency response	f = 40 to 550 MHz	–	–	±0.3	dB
S <sub>11</sub>	input return losses	f = 40 to 80 MHz	20	31	–	dB
		f = 80 to 160 MHz	19	29	–	dB
		f = 160 to 320 MHz	18	25	–	dB
		f = 320 to 550 MHz	17	21	–	dB
S <sub>22</sub>	output return losses	f = 40 to 80 MHz	20	26	–	dB
		f = 80 to 160 MHz	19	27	–	dB
		f = 160 to 320 MHz	18	26	–	dB
		f = 320 to 550 MHz	17	24	–	dB
S <sub>21</sub>	phase response	f = 50 MHz	–45	–	+45	deg
CTB	composite triple beat	77 channels flat; V <sub>o</sub> = 44 dBmV; measured at 547.25 MHz	–	–67	–66	dB
X <sub>mod</sub>	cross modulation	77 channels flat; V <sub>o</sub> = 44 dBmV; measured at 55.25 MHz	–	–67	–66	dB
CSO	composite second order distortion	77 channels flat; V <sub>o</sub> = 44 dBmV; measured at 548.5 MHz	–	–67	–60	dB
d <sub>2</sub>	second order distortion	note 1	–	–	–70	dB
V <sub>o</sub>	output voltage	d <sub>im</sub> = –60 dB; note 2	63.5	–	–	dBmV
F	noise figure	see Table 1	–	–	–	dB
I <sub>tot</sub>	total current consumption (DC)	note 3	–	425	435	mA

**Notes**

1.  $f_p = 55.25$  MHz;  $V_p = 44$  dBmV;  
 $f_q = 493.25$  MHz;  $V_q = 44$  dBmV;  
measured at  $f_p + f_q = 548.5$  MHz.
2. Measured according to DIN45004B:  
 $f_p = 540.25$  MHz;  $V_p = V_o$ ;  
 $f_q = 547.25$  MHz;  $V_q = V_o - 6$  dB;  
 $f_r = 549.25$  MHz;  $V_r = V_o - 6$  dB;  
measured at  $f_p + f_q - f_r = 538.25$  MHz.
3. The module normally operates at  $V_B = 24$  V, but is able to withstand supply transients up to 30 V.

## CATV amplifier module

## BGD704

**Table 4** Bandwidth 40 to 450 MHz;  $V_B = 24$  V;  $T_{mb} = 35$  °C;  $Z_S = Z_L = 75$   $\Omega$ 

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G <sub>p</sub>	power gain	f = 50 MHz	19.5	20	20.5	dB
		f = 450 MHz	20	20.6	–	dB
SL	slope cable equivalent	f = 40 to 450 MHz	0	–	2	dB
FL	flatness of frequency response	f = 40 to 450 MHz	–	–	±0.3	dB
S <sub>11</sub>	input return losses	f = 40 to 80 MHz	20	31	–	dB
		f = 80 to 160 MHz	19	29	–	dB
		f = 160 to 320 MHz	18	25	–	dB
		f = 320 to 450 MHz	17	21	–	dB
S <sub>22</sub>	output return losses	f = 40 to 80 MHz	20	26	–	dB
		f = 80 to 160 MHz	19	27	–	dB
		f = 160 to 320 MHz	18	26	–	dB
		f = 320 to 450 MHz	17	25	–	dB
S <sub>21</sub>	phase response	f = 50 MHz	–45	–	+45	deg
CTB	composite triple beat	60 channels flat; V <sub>o</sub> = 46 dBmV; measured at 445.25 MHz	–	–	–67	dB
X <sub>mod</sub>	cross modulation	60 channels flat; V <sub>o</sub> = 46 dBmV; measured at 55.25 MHz	–	–	–64	dB
CSO	composite second order distortion	60 channels flat; V <sub>o</sub> = 46 dBmV measured at 446.5 MHz	–	–	–63	dB
d <sub>2</sub>	second order distortion	note 1	–	–	–73	dB
V <sub>o</sub>	output voltage	d <sub>im</sub> = –60 dB; note 2	66	–	–	dBmV
F	noise figure	see Table 1	–	–	–	dB
I <sub>tot</sub>	total current consumption (DC)	note 3	–	425	435	mA

**Notes**

1.  $f_p = 55.25$  MHz;  $V_p = 46$  dBmV;  
 $f_q = 391.25$  MHz;  $V_q = 46$  dBmV;  
measured at  $f_p + f_q = 446.5$  MHz.
2. Measured according to DIN45004B:  
 $f_p = 440.25$  MHz;  $V_p = V_o$ ;  
 $f_q = 447.25$  MHz;  $V_q = V_o - 6$  dB;  
 $f_r = 449.25$  MHz;  $V_r = V_o - 6$  dB;  
measured at  $f_p + f_q - f_r = 438.25$  MHz.
3. The module normally operates at  $V_B = 24$  V, but is able to withstand supply transients up to 30 V.

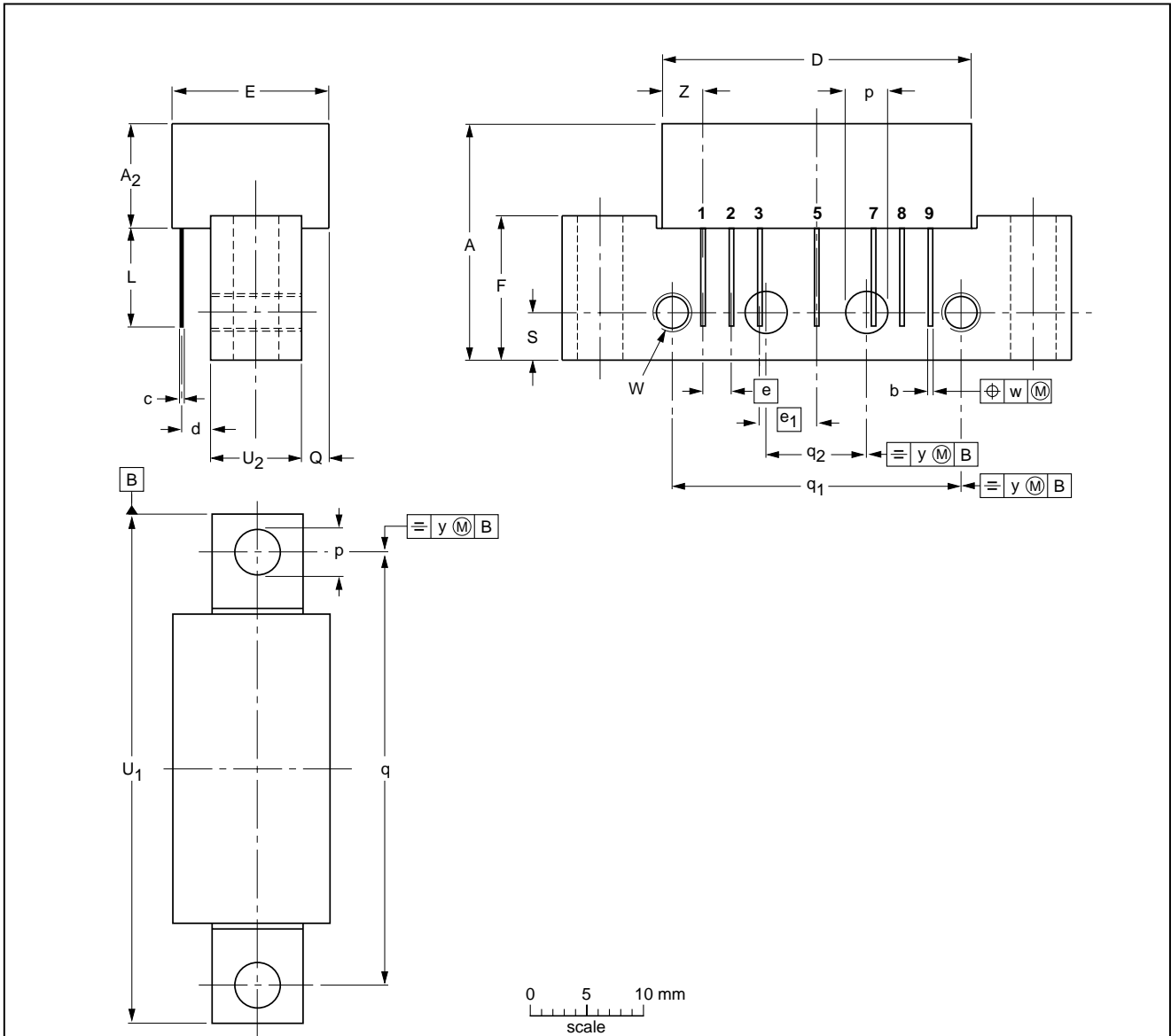
CATV amplifier module

BGD704

PACKAGE OUTLINE

Rectangular single-ended package; aluminium flange; 2 vertical mounting holes; 2 x 6-32 UNC and 2 extra horizontal mounting holes; 7 gold-plated in-line leads

SOT115J



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A <sub>2</sub> max.	b	c	D max.	d max.	E max.	e	e <sub>1</sub>	F	L min.	p	Q max.	q	q <sub>1</sub>	q <sub>2</sub>	S	U <sub>1</sub> max.	U <sub>2</sub>	W	w	y	Z max.
mm	20.8	9.1	0.51 0.38	0.25	27.2	2.54	13.75	2.54	5.08	12.7	8.8	4.15 3.85	2.4	38.1	25.4	10.2	4.2	44.75	8	6-32 UNC	0.25	0.1	3.8

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT115J						99-02-06

## CATV amplifier module

BGD704

**DEFINITIONS**

<b>Data sheet status</b>	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
<b>Limiting values</b>	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
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Where application information is given, it is advisory and does not form part of the specification.	

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**NOTES**

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**NOTES**

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**NOTES**

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